

# A Guideline for the Extraction of First Permanent Molars in Children.

## Introduction

The relative timing of coronal development associated with first permanent molars makes them susceptible to chronological enamel defects leading to hypo-mineralisation and/or hypoplasia<sup>1</sup>; whilst their eruption at around six years of age makes them vulnerable to the development of dental caries<sup>2</sup>. In addition, combined first permanent molar-incisor hypomineralisation (MIH) is a recognized condition of unknown aetiology with a prevalence of around fifteen per cent in Caucasians<sup>3</sup>. Currently, the majority of first permanent molars are extracted because of dental caries<sup>4</sup>.

## First permanent molars of poor prognosis

A child can often present with a developing dentition affected by one or more first permanent molars of poor prognosis, which may necessitate enforced extraction; or require some consideration toward elective extraction in the form of balancing or compensating extractions.

Treatment-planning decisions regarding first permanent molars of poor prognosis should ideally be made following input from both the general or paediatric dentist and the orthodontist, although this may not always be possible. These guidelines offer best advice on the management of this condition in the child. However, it is important to remember that in addition to the presenting clinical features a number of additional factors may influence the decision-making process. These include a child's social background, their likely ability to co-operate with restorative or orthodontic treatment, prevention and oral hygiene practice within the family, as well as any local difficulties in accessing NHS restorative or orthodontic treatment.

### *Balancing and compensating extractions*

In some circumstances, the enforced extraction of one first permanent molar should be accompanied by the elective balancing or compensating extraction of another.

- Balancing extraction refers to removal of the first molar from the contra-lateral side of the same dental arch.
- Compensating extraction refers to removal of the first molar from the same side of the opposing dental arch.

The principle factors dictating whether a first molar is recommended for either a balancing or compensating extraction will be:

- Which first molar requires enforced extraction.
- The overall condition and long-term prognosis.
- Teeth present within the developing dentition (particularly third molars).
- The underlying malocclusion.

As a general rule, compensating extraction of an upper first molar is often recommended when extraction of the lower is required. This is to prevent over-eruption of an unopposed upper first molar and prevention of mesial movement of the lower second molar. There is, however, little definitive data with regard to these effects in the literature<sup>5</sup>. Balancing the extraction of healthy first molars is not generally recommended in either arch and there is little evidence that unilateral extraction will adversely effect the dental centreline<sup>6</sup>.

### *Treatment planning goals*

Ideally, first permanent molar extractions should be followed by successful eruption of the second molars to replace them and ultimately, the third molars to complete the molar dentition. However, achieving this can be complicated by a number of factors:

- Timing of first molar extraction will have an important influence on the subsequent eruptive position of the second molar, particularly in the lower arch.
- Third molar development cannot always be confirmed at the time extraction decisions have to be made.

In addition, consideration also needs to be given to the consequences of first molar extraction for the developing occlusion, particularly in the presence of an underlying malocclusion.

In many cases, at least one first permanent molar may require enforced extraction because of its poor condition and unfavourable long-term prognosis. At this stage, a decision should also be made regarding the need for elective extraction of any other teeth. This decision will be influenced primarily by their condition and the underlying occlusion. Before any extraction decisions are made, good quality radiographs are required to show the presence, condition and developmental stage of all teeth in the dentition. If any teeth in the permanent dentition are missing or in a poor eruptive position, this can significantly affect the decision-making process. Ideally, an orthodontic opinion should be obtained, preferably from the orthodontist responsible for future treatment, whenever this is practically possible.

- In the absence of a definitive opinion and if the use of local anaesthetic is practical, enforced extraction should be carried out and advice sought regarding further elective extractions.
- If a general anaesthetic is the only option, advice on elective extractions should be obtained beforehand, if at all possible, to prevent the risk of multiple anaesthetics.

[SIGN Grade C]

### **Ideal timing of first permanent molar extraction**

In the upper arch, the developmental position of an unerupted second permanent molar generally ensures that this tooth will achieve a good occlusal position following extraction of the first permanent molar.

In the lower arch, achieving a good occlusion is more dependent upon the timing of the first permanent molar extraction.

- Generally, whenever practical the lower first molar should be extracted when there is radiographic evidence of early dentine calcification within the second molar root bifurcation. This usually occurs within a chronological age range of 8 to 10 years<sup>7,8</sup>.

If the first molar is extracted before the age of eight years, there is often no radiographic evidence of third molar development. In addition, in the lower arch:

- The second premolar can drift distally into the extraction space, tip and rotate<sup>9</sup>.
- The labial segments can retrocline with an accompanying increase in the overbite<sup>9-11</sup>.

If the first molar is extracted during the later stages of second molar eruption:

- The second molar may tip mesially and rotate mesio-lingually, producing spacing and poor occlusal contacts<sup>7</sup>.
- The erupted second premolar can migrate distally.

Extraction of a first permanent molar is rarely the extraction of choice. However, favourable spontaneous development of the dentition and space closure can be expected in the majority of cases<sup>6</sup>. It is also possible to achieve good results following the removal of these teeth using fixed appliances, although treatment times tend to be increased<sup>12,13</sup>. It is not advisable to extract a healthy premolar for orthodontic purposes if the first permanent molar in the same quadrant is heavily restored<sup>14</sup>.

[SIGN Grade C]

### **Guidelines for elective first molar extraction**

A number of general guidelines on treatment planning first permanent molar extraction cases for a number of malocclusions are available<sup>9,15-20</sup>. As a general rule, if in doubt, get the patient out of pain, try and maintain the teeth and refer for an orthodontic opinion.

[SIGN Grade C]

## Class I cases

### *Class I cases with minimal crowding ( $\leq 3\text{mm}$ )*

Aim for extraction at the optimal time for eruption of the second molars into a good position.

- Do not balance unilateral first molar extraction in either the upper or lower arches with healthy first molars.
- If the lower first molar is to be lost, compensating extraction of the upper first molar should be considered to avoid overeruption of this tooth<sup>21</sup>, unless the lower second molar has already erupted and the upper first molar is in occlusal contact with it.
- If the upper first molar is to be lost, do not compensate with extraction of the lower first molar if it is healthy.

[SIGN Grade C]

### *Class I cases with crowding*

In the presence of crowding in the buccal segments, extract at the optimal time to allow eruption of second molars into a good occlusal position and this should provide some relief of any premolar crowding.

- If the buccal segment crowding is bilateral, consider balancing extraction to provide suitable relief and maintain the centreline.
- Compensating extraction of upper first molars should be considered to prevent overeruption or relieve premolar crowding

In the presence of crowding in the labial segments, little spontaneous relief is provided by first molar extraction.

- First molar extractions can be delayed until the second molars have erupted and then the extraction space used for alignment with fixed appliances.
- Alternatively, first molars can be extracted at the optimum time and the crowding treated once in the permanent dentition. If premolar extractions are likely to be required at this stage, the third molars should be present.

[SIGN Grade B]

## Class II cases

The extraction of first permanent molars in Class II cases can be more difficult to plan, particularly with regard to the timing of upper first molar extraction<sup>17</sup>. The main complicating factors often involve the upper arch because of the need for space to correct the incisor relationship.

### *Class II cases with minimal crowding*

Lower first molar extraction should be carried out at the ideal time for successful eruption of the second permanent molar and control of the second premolar. Compensating and balancing extraction of healthy lower first molars are not indicated.

In the upper arch, space will often be required to correct the incisor relationship:

- If the upper first permanent molars require immediate extraction, orthodontic treatment may be instituted to correct the incisor relationship. A functional appliance or removable appliance and headgear can be used to correct the buccal segment relationship, followed by fixed appliances if required.
- Alternatively, after extraction of the upper first permanent molars, the second permanent molars can be allowed to erupt and the incisor relationship corrected once this has taken place. Correction of the malocclusion at this stage can involve any of the methods described above. In addition, if there is radiographic evidence of third molar development, then further space for incisor correction could be created by the loss of two upper premolars teeth.
- If the upper first permanent molars can be temporised or restored, then their extraction can be delayed until the second permanent molars have erupted. the resultant extraction

space can then be used to correct the malocclusion with fixed appliances. If the upper first molars are to be left unopposed, a simple removable appliance may be required to prevent their over-eruption, whilst waiting for the second molars to erupt. Alternatively, a functional appliance can be used immediately to correct the incisor relationship prior to extraction of the first molars and fixed appliances.

- If the upper first permanent molar is sound, elective extraction may be indicated if it is at risk of over-erupting; however, the third molars should ideally be present radiographically. The class II relationship can then be managed as for immediate extraction of upper first molars with a poor prognosis. If there is no sign of upper third molar development, an appliance to prevent the over-eruption of sound upper first molars should be considered and the malocclusion managed following eruption of the second molars.

[SIGN Grade C]

#### *Class II case with crowding.*

Space will also be required in the lower arch for the relief of crowding.

- If the third molars are present radiographically, lower first molars can be extracted at the optimum time to allow second molar eruption and then premolars extracted at a later stage for the correction of crowding. In these cases, fixed appliances will usually be required.
- Alternatively, first molars can be extracted after second molar eruption and the space used directly for the correction of crowding with fixed appliances.
- Balancing and compensating extraction of lower first molars are not generally required.

Space requirements in the upper arch can be significant - for the relief of crowding and correction of the incisor relationship *i.e.* increased overjet. The upper first permanent molars should be temporised or restored and the child referred to a specialist orthodontist whenever possible.

If the upper first permanent molar is unopposed, at risk of over-erupting and third molars are present radiographically, then extraction of the upper first molar may be indicated. The patient should be counselled that additional premolar extractions in the upper arch may be required in the future to create sufficient space for crowding relief and incisor correction.

[SIGN Grade C]

#### **Class III cases**

Class III cases are often even more difficult to manage and ideally require the opinion of a specialist orthodontist before any first permanent molars are extracted. As a general rule, extraction of maxillary molars should be avoided if at all possible, whilst balancing and compensating extractions are not recommended in class III cases<sup>17</sup>.

[SIGN Grade C]

## **SIGN Classification**

The Scottish Intercollegiate Guideline Network (SIGN) classification system indicates whether a guideline's recommendations are based on proven scientific evidence or currently accepted good clinical practice with limited scientific evidence.

<b>Level</b>	<b>Type of evidence</b>
Ia	Evidence obtained from meta-analysis or randomised control trials.
Ib	Evidence from at least one randomised control trial.
IIa	Evidence obtained from at least one well-designed control study without randomisation.
IIb	Evidence obtained from at least one other type of well-designed quasi-experimental study without randomisation.
III	Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case control studies.
IV	Evidence from expert committee reports or opinions and/or clinical evidence of respected authorities.

<b>Grade</b>	<b>Recommendations</b>
A> (Evidence levels 1a,1b)	Requires at least one randomised controlled trial as part of the body of literature of overall good quality and consistency addressing the specific recommendations.
B> (Evidence levels IIa,IIb,III)	Requires availability of well conducted trials but no randomised clinical trials on the topic of recommendation.
C> (Evidence level IV)	Requires evidence from expert committee reports or opinions and/or clinical experience of respected authorities. Indicates absence of directly applicable studies of good quality.

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